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EPA-REGION 10

September 6, 2016

U.S. Environmental Protection Agency, Region 10  
ATTN: Harbor Comments  
U.S. Environmental Protection Agency  
805 SW Broadway, Suite 500  
Portland, OR 97205

Re: Portland Harbor Superfund Site  
NW Natural Comments on Proposed Plan

Dear EPA Region 10:

NW Natural appreciates the opportunity to comment on EPA's June 8, 2016 Proposed Plan and draft Final Feasibility Study for the Portland Harbor Superfund Site.

#### Introduction

NW Natural has worked closely with EPA for more than fifteen years toward a cleanup of sediments adjacent to its Gasco facility, located at about Willamette River Mile 6 West within the ten mile Portland Harbor Superfund Site. NW Natural is a signatory to the September 28, 2001 Administrative Settlement Agreement and Order on Consent for the Portland Harbor Remedial Investigation and Feasibility Study and has, since 2001, served as the project coordinator for the Respondents to that Order.<sup>1</sup> In 2004, NW Natural entered into a Consent Order with EPA for removal of a tar-like feature offshore of NW Natural's Gasco facility within Portland Harbor;<sup>2</sup> NW Natural successfully completed the removal of that feature in 2005.<sup>3</sup> On September 9, 2009, NW Natural and EPA entered into a second Administrative Settlement and Agreement and Order on Consent for the Gasco Sediments Site (the Gasco Consent Order) to complete early remedial design work intended to facilitate remedy implementation expeditiously after EPA selects a remedy for Portland Harbor.<sup>4</sup> NW Natural's May 2012 Engineering Evaluation and Cost Analysis (the Gasco EE/CA) compiles the results of several pre-remedial design investigations and evaluates a number of alternatives for a final remedial action at the Gasco Sediments Site based upon detailed, site-specific information evaluated in accordance with site-specific criteria established in the Gasco Consent Order.<sup>5</sup>

<sup>1</sup> Administrative Settlement Agreement and Order on Consent for Remedial Investigation and Feasibility Study, Portland Harbor Superfund Site, U.S. EPA Region 10 Docket Number CERCLA-10-2001-0240 (September 28, 2001).

<sup>2</sup> Administrative Order on Consent for Removal Action, U.S. EPA Region 10 CERCLA Docket Number 10-2004-0068 (April 28, 2004)

<sup>3</sup> *Gasco Early Removal Action Construction Oversight Report* (EPA, November 16, 2006).

<sup>4</sup> Administrative Settlement Agreement and Order on Consent for Removal Action, U.S. EPA Region 10, CERCLA Docket Number 10-2009-0255 (September 9, 2009)

<sup>5</sup> *Engineering Evaluation/Cost Estimate, Gasco Sediments Cleanup Site* (AnchorQEA May 2012). Attachment 1 shows the location of the Gasco facility with the Portland Harbor.

Simultaneously, NW Natural has been working with the Oregon Department of Environmental Quality (DEQ) on investigation, source control and cleanup of the upland Gasco site. Under DEQ oversight, NW Natural has installed a hydraulic control and containment system along the full length of the Gasco shoreline and the northern portion of the adjacent Siltronic property; the system, which includes a state-of-the-art water treatment plant, has been fully operational since 2013. NW Natural and DEQ expect to complete a feasibility study for the entire Gasco uplands (including the northern portion of the Siltronic property) within the next two years.

Collectively, NW Natural has, to date, incurred in excess of \$100 million to cooperate with EPA, DEQ and EPA's federal, state and Tribal partners at Gasco and on the Portland Harbor cleanup.

As a member of the Lower Willamette Group, NW Natural participated in the development of the LWG's comments on EPA's draft Final FS and Proposed Plan.<sup>6</sup> As discussed in the LWG's comments, EPA's FS and Proposed Plan diverge from the baseline risk assessments for Portland Harbor, inaccurately evaluate the effectiveness, duration and cost of various remedial alternatives, and propose a cleanup that is almost entirely disconnected from the facts before EPA as well as from EPA guidance, law and principles of good science. Nonetheless, NW Natural believes the work completed by EPA, the LWG and NW Natural does provide EPA with the information and tools it needs to prepare a scientifically sound and cost-effective Record of Decision (ROD) for Portland Harbor, including the Gasco Sediments Site, that is capable of implementation through performance settlements with responsible parties.

The LWG's comments recommend a remedial approach that will result in a protective, effective remedy in less time, with less short term risk and at lower cost than EPA's current preferred alternative.<sup>7</sup> NW Natural's comments provide additional detail on how EPA's Record of Decision should be structured to provide the basis for a negotiated performance settlement capable of implementation within a reasonable timeframe. Our comments also discuss how EPA should integrate the work completed by EPA and NW Natural under the Gasco Consent Order into the Portland Harbor ROD to expedite remedial design and cleanup at Gasco as EPA and NW Natural intended.<sup>8</sup>

#### Comments

EPA's Proposed Plan presents a plan for cleaning up Portland Harbor that has no rational connection to risks and conditions documented to be present at the site, is unnecessarily expensive, and will take too long to complete. Specifically, EPA's Proposed Plan

- Identifies cleanup levels and requirements for active cleanup using methods that are inconsistent with EPA's approved risk assessments and largely unexplained in either the Proposed Plan or the draft Final FS;

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<sup>6</sup> Lower Willamette Group Comments on Portland Harbor Proposed Plan, September 6, 2016. NW Natural's comments rely upon and incorporate the LWG's comments by reference.

<sup>7</sup> The LWG's recommended approach is consistent with its comments to the National Remedy Review Board dated October 19, 2015. *See, LWG Recommended Approach to Portland Harbor Cleanup Lower Willamette River* (October 19, 2015).

<sup>8</sup> NW Natural's comments also provide additional information for the Administrative Record. This information primarily consists of deliverables prepared by NW Natural and submitted to EPA, information exchanged between EPA and NW Natural and previously provided by NWN to EPA. We are incorporating these and similar records into our comments on the Proposed Plan for inclusion in the Administrative Record file pursuant to 40 CFR §300.815(b).



- Assigns prescriptive remedial technologies without regard to existing site-specific information or allowances for information that might be developed during remedial design;
- Ignores significant and costly source control measures undertaken by NW Natural under Oregon Department of Environmental Quality oversight as well as many years of studies and evaluations performed by NW Natural under the Gasco Consent Order; and
- Fails to provide a transparent vision, accurate cost and feasible timeline for implementation of the cleanup.<sup>9</sup>

For the reasons described below and in the LWG's comments on the Proposed Plan, EPA's Proposed Plan and the draft Final FS do not provide the foundation for a workable cleanup of Portland Harbor.

NW Natural believes, however, that the existing data, scientific analyses and engineering evaluations are adequate for EPA to select an appropriate remedy for Portland Harbor that

1. clearly ties sediment cleanup levels to risks identified in the risk assessments and to risk reduction achievable through a sediment cleanup;
2. acknowledges that technology assignments selected for FS purposes will recognize existing upland source controls and will be refined during remedial design to allow site-specific evaluations and new information to optimize remedy effectiveness and reduce uncertainty;
3. prioritizes action to address the most significant risks at the site by breaking the site up into operable units; and
4. applies adaptive management principles by selecting higher remedial action levels so that site clean-up can focus on areas of highest potential risk and minimize disruption to the river system.

We believe that a ROD based on this approach would be consistent with EPA's identified principles for managing contaminated sediment sites and would be capable of implementation through performance settlements.<sup>10</sup>

Our detailed comments below provide the bases for our disagreement with EPA's Proposed Plan as well as our suggestions for the Record of Decision.

1. *EPA should clearly tie sediment cleanup levels to risk reduction achievable through a sediment cleanup.*

The LWG's prior work<sup>11</sup> demonstrated that, when applied to surface sediments in relevant exposure areas, active remediation areas (known as sediment management areas or SMAs) defined by

- (1) the Alternative B remedial action levels (RALs) developed with EPA concurrence for the LWG's 2012 draft Feasibility Study (a PCB RAL of 1000 µg/kg, a DDE RAL of 1000 µg/kg, and a cPAH (as BaPEq) RAL of 20,000 µg/kg); and

<sup>9</sup> The LWG's comments include a detailed discussion of missing and inaccurate cost information in EPA's draft Final FS, and we will not repeat that discussion here. As noted at footnote 53 below, however, although the LWG's review concluded that EPA had underestimated harborwide remedy implementation costs by about half, costs for the Gasco Sediment Site are likely to be about three times EPA's estimate.

<sup>10</sup> *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites*, OSWER 9285.6-08 (February 2002)

<sup>11</sup> Draft Feasibility Study (LWG, March 30, 2012)

- (2) the Comprehensive Benthic Risk Area (CBRA) approach developed by EPA and the LWG for the FS through early 2015 using the multiple lines of evidence evaluation for benthic toxicity in the approved Baseline Ecological Risk Assessment (BERA)

would remove most of the potential risks identified in the Baseline Risk Assessments (BLRAs) immediately following construction.

PAH RALs should not be applied in the navigation channel. The RALs must be applied only in exposure areas where the BLRAs found unacceptable risks from the RAL chemicals. As discussed in the LWG comments,<sup>12</sup> EPA's preferred alternative requires significant amounts of dredging at locations where exposure to the RAL chemicals driving the cleanup either does not occur, where preliminary remediation goals (PRGs) for those chemicals are already met, or where the BLRAs did not find unacceptable risk for a given contaminant/exposure pathway. The most dramatic example of this is the approximately 25 acres of dredging EPA plans in the navigation channel based upon preliminary remediation goals for polycyclic aromatic hydrocarbons (PAHs) developed for shellfish consumption, an exposure scenario that cannot occur in the navigation channel. No one goes clamming in 50 feet of water in the middle of the river.

The BHHRA is clear that fish consumption risks from cPAHs are likely less than one percent of the total cumulative risks for the fish consumption pathway.<sup>13</sup> EPA has been unable to develop a technically sound cPAH sediment PRG for fish consumption because there is no observable relationship between sediment sources and PAH concentrations in fish tissue.<sup>14</sup> Because it was unable to link cPAHs in sediment to fish consumption risk, and despite the marginal cPAH fish consumption risk, EPA assigned a shellfish consumption PRG to the navigation channel as a surrogate for fish consumption,<sup>15</sup> even though no shellfish harvesting can occur within the navigation channel. EPA cannot simply assume that a PRG based on bioaccumulation in shellfish is representative of or necessary for protection of humans consuming fish.<sup>16</sup> A "rich and comprehensive" body of scientific literature establishes that vertebrate fish and shellfish metabolize PAHs very differently and that there is "very low risk of exposure

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<sup>12</sup> Lower Willamette Group Comments on Portland Harbor Proposed Plan, September 6, 2016, pp. 13-14.

<sup>13</sup> See Figure 7-3 of the EPA-approved BHHRA.

<sup>14</sup> Please see the technical memorandum, *Critique of EPA Revised PRGs and RALs, Portland Harbor Feasibility Study* (AnchorQEA, August 2016), Attachment 2. EPA's own internal reviews indicate this. See memorandum May 2016 "Evaluation of analyses used to calculate bioaccumulation calculation results Portland Harbor Superfund Site RAC Contract Number EP-W-05-049" to EPA Region 10 Portland Harbor RI/FS File from Portland Harbor RI/FS Team. Further, the science is extensive that PAHs do not readily accumulate in vertebrate fish tissue. See Meador et al. 1995, Reviews of Environmental Contamination and Toxicology 143:79-164; September 2014 Toxicological Review of Benzo(a)pyrene, ORD EPA/635/R-14/312a; Varanasi, et al. 1989, Biotransformation and Disposition of Polycyclic Aromatic Hydrocarbons (PAHs) in Fish: In Varanasi U (ed); Metabolism of Polycyclic Aromatic Hydrocarbons (PAHs) in the Aquatic Environment, CRC Press; and Metabolism of PAHs in Teleost Fish-Scientific Findings, Memorandum from the Northwest Fisheries Science Center of NMFS, available at [http://sero.nmfs.noaa.gov/deepwater\\_horizon/previous\\_reopening/index.html](http://sero.nmfs.noaa.gov/deepwater_horizon/previous_reopening/index.html), October 22, 2010 and enclosed as Attachment 3.

<sup>15</sup> 2016 draft Final FS Appendix B, p. B-35.

<sup>16</sup> In response to LWG comments noting this fact, EPA's explanation for such an assumption was, "EPA calculated a PRG for cPAHs to address unacceptable risks associated with consumption of shellfish, and we anticipate that this PRG will also address the unacceptable risks identified in the BHHRA associated with consumption of fish." See, April 10, 2015 email from Kristine Koch to Jim McKenna and Bob Wyatt. EPA has never explained what the scientific basis is for using a shellfish BSAR as a surrogate for a vertebrate fish BSAR. See, April 10, 2015 email from Kristine Koch to Jim McKenna and Bob Wyatt.



to PAHs that are a health concern for humans consuming finfish.”<sup>17</sup> In the Lower Duwamish Waterway ROD, in fact, EPA concluded that development of a sediment cPAH PRG for the human health seafood consumption pathway was inappropriate because there was no observable relationship between cPAH sediment and tissue concentrations.<sup>18</sup>

Not only is this entire approach inconsistent with the BLRAs, information from EPA’s draft Final FS demonstrates that application of TPAH RALs is also unnecessary to attain the surrogate cPAH shellfish PRG of 3,950 µg/kg.

Figure 1 shows the immediate post construction cPAH SWACs for whole river miles (rolling river miles from bank to bank including both navigation channel and more shallow shoreline areas) achieved by EPA’s alternatives. Whole river miles are shown because that spatial scale is consistent with the smallest relevant exposure scale used in the BHHRA (e.g., smallmouth bass) for fish consumption risk assessment.<sup>19</sup> Figure 1 also shows the SWACs achieved without applying the total PAH RALs in the navigation channel and instead using the CBRAs as proposed by the LWG. This alternative, labeled B with CBRAs,<sup>20</sup> is depicted by the light purple line. Alternative B is used in this example because it has the smallest active remediation footprint and produces the highest (most conservative) post construction SWACs.

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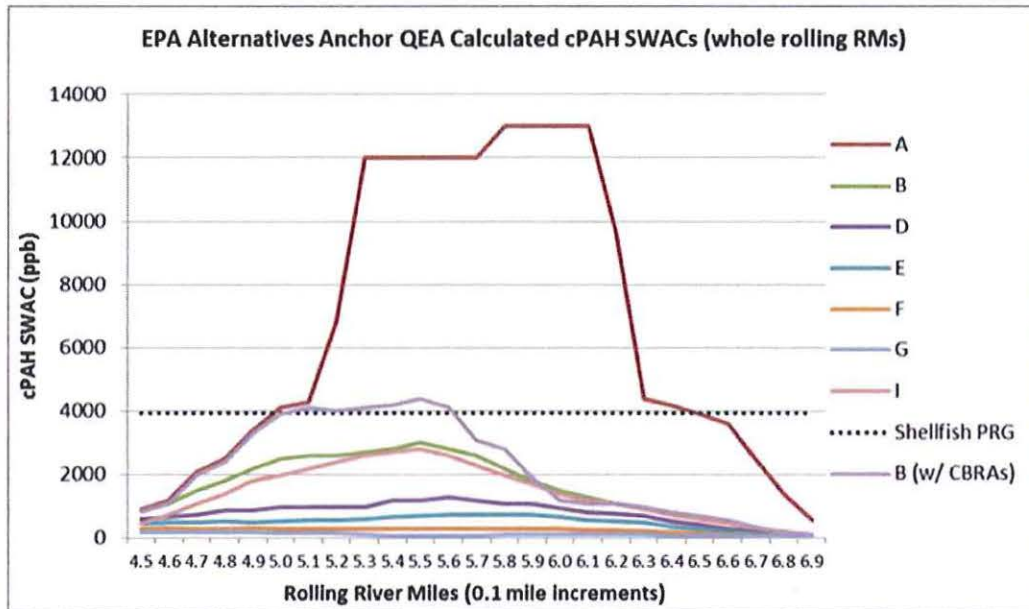
<sup>17</sup> *Metabolism of Polycyclic Aromatic Hydrocarbons (PAHs) in the Aquatic Environment*, CRC Press; and *Metabolism of PAHs in Teleost Fish-Scientific Findings*, Memorandum from the Northwest Fisheries Science Center of NMFS (vertebrate fish enjoy “highly efficient metabolism of PAHs” whereas bivalves such as oysters and clams have a “low capacity to metabolize PAHs.”)

<sup>18</sup> Lower Duwamish Waterway Superfund Site Record of Decision, November 2014, p.75.

<sup>19</sup> EPA’s draft Final FS uses river miles split longitudinally into three “transects” representing east shoreline, navigation channel, and west shoreline. As noted in the LWG Proposed Plan comments, this transect approach is not consistent with any exposure spatial scale used in either the BERA or BHHRA for any receptor or scenario. Lower Willamette Group Comments on Portland Harbor Proposed Plan, September 6, 2016, p. 19.

<sup>20</sup> Please see discussion of the EPA/LWG CBRA approach, *infra* at p. 9.

Figure 1. Whole Rolling River Mile cPAH SWACs for EPA's Alternatives and Alternative B using CBRAs.

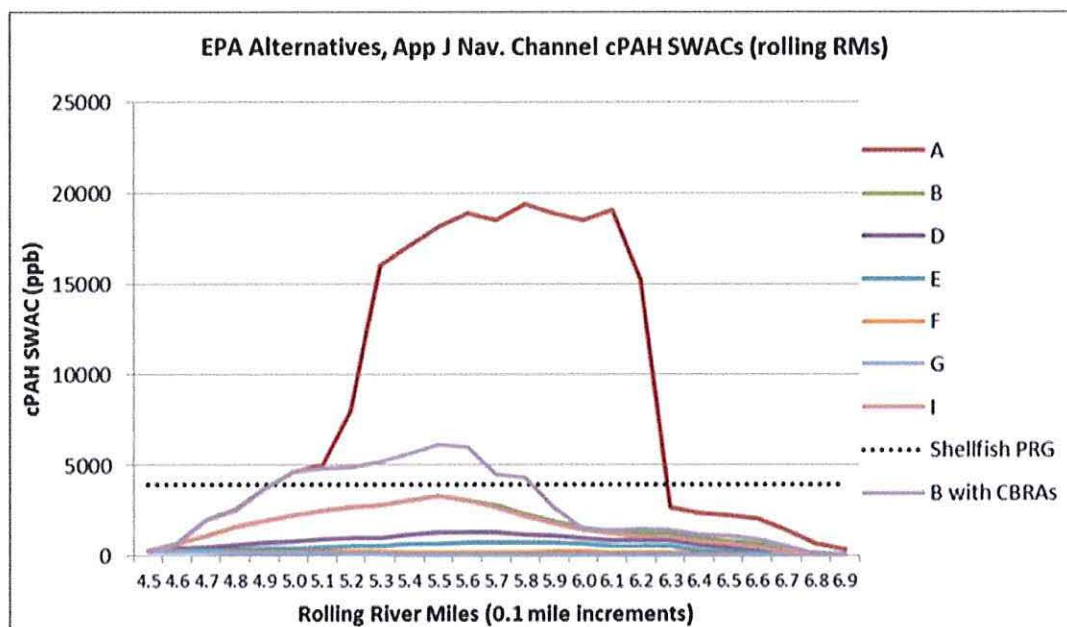


This simple comparison shows that even the least aggressive of EPA's alternatives will still substantially reduce cPAH concentrations across the site without application of PAH RALs in the navigation channel and using the CBRAs instead. EPA's surrogate shellfish consumption PRG is shown for comparative purposes, and Alternative B using the CBRAs meets that PRG or only slightly exceeds it in a few river miles, without the need for application of PAH RALs in the navigation channel.

Even if this analysis is confined to just the navigation channel transect (the approach EPA uses in the draft Final FS, but which is inconsistent with the BHHRA), the results still indicate substantial cPAH SWAC reductions from Alternative B using the CBRAs (see Figure 2). The resulting SWACs are still only slightly above the shellfish PRG in several rolling river miles and are significantly below them in most of the others. Clearly, alternatives can be devised that are consistent with the BLRAs and that produce substantial cPAH SWAC reductions without the major dredging project contemplated by EPA's preferred alternative.



Figure 2. Navigation Channel Rolling River Mile cPAH SWACs for EPA's Alternatives and Alternative B using CBRAs.



Figures 1 and 2 illustrate substantial SWAC reductions without need for application of total PAH RALs in the navigation channel.

More to the point, EPA's Proposed Plan evaluates the protectiveness and effectiveness of EPA's remedial alternatives by comparison to "interim targets."

These interim targets are intended to specify the level of risk that is ideally achieved through active cleanup. Once these levels are achieved, natural recovery is then the mechanism for further reducing contaminant levels to PRGs. Based on the lines of evidence developed for supporting natural recovery, it is assumed that if the interim targets are achieved, natural recovery will be sufficient in cleaning the Site to protective levels.<sup>21</sup>

Figure 3 shows the total fish consumption risks at completion of construction for Alternative I consistent with those presented in EPA's 2016 FS Appendix J (green line).<sup>22</sup> These risks are generally around the  $1 \times 10^{-4}$  cancer risk level, which also happens to be EPA's "interim target" for evaluation of immediate post construction risks (black dotted line). Figure 3 compares these total fish consumption risks to fish consumption cancer risks for cPAHs only for EPA's Alternative A (existing condition red line) and EPA's

<sup>21</sup> Proposed Plan, p. 51.

<sup>22</sup> Because EPA's 2016 FS incorrectly splits river miles into transects, these whole rolling river mile total risks were recreated by combining EPA's Appendix J transect risk estimates on an area-proportional basis. These recreated estimates might differ slightly from a more appropriate analysis starting with whole river mile SWACs, had EPA conducted such an analysis. However, any such differences are likely to be very minor and would not impact the conclusions here.

Alternative I (pink line) using EPA's shellfish PRG and associated assumptions. Using EPA's PRGs (with which we have explained our disagreement) cPAHs contribute cancer risks that are about two orders of magnitude less than the total fish consumption risk across all these river miles and well below the "interim target." Further, the purple line shows EPA's Alternative I with the application of the CBRAs in the navigation channel, instead of total PAH RALs. As seen in Figures 1 and 2, the EPA/LWG CBRA approach, which is more consistent with the BLRAs, achieves nearly the same levels of cPAH risk reduction and still achieves cPAH risks that are orders of magnitude less than the total risk reduction achieved by EPA's Alternative I.

**Figure 3. Whole Rolling River Mile Total Fish Consumption and cPAH Cancer Risks Consistent with EPA's 2016 FS Appendix J for Select EPA Alternatives and Alternative I with CBRAs.**

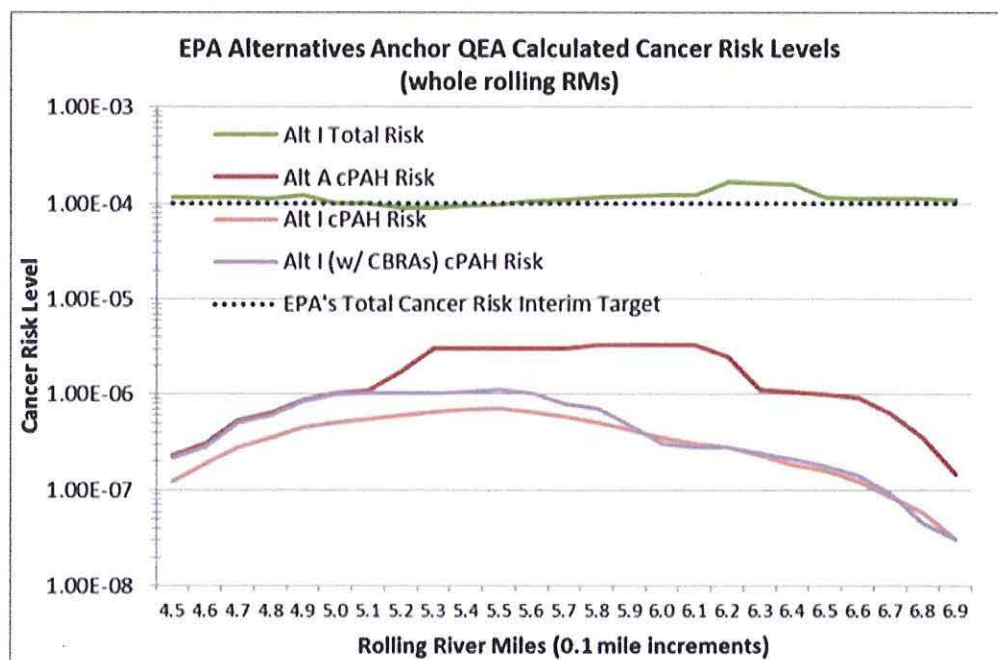
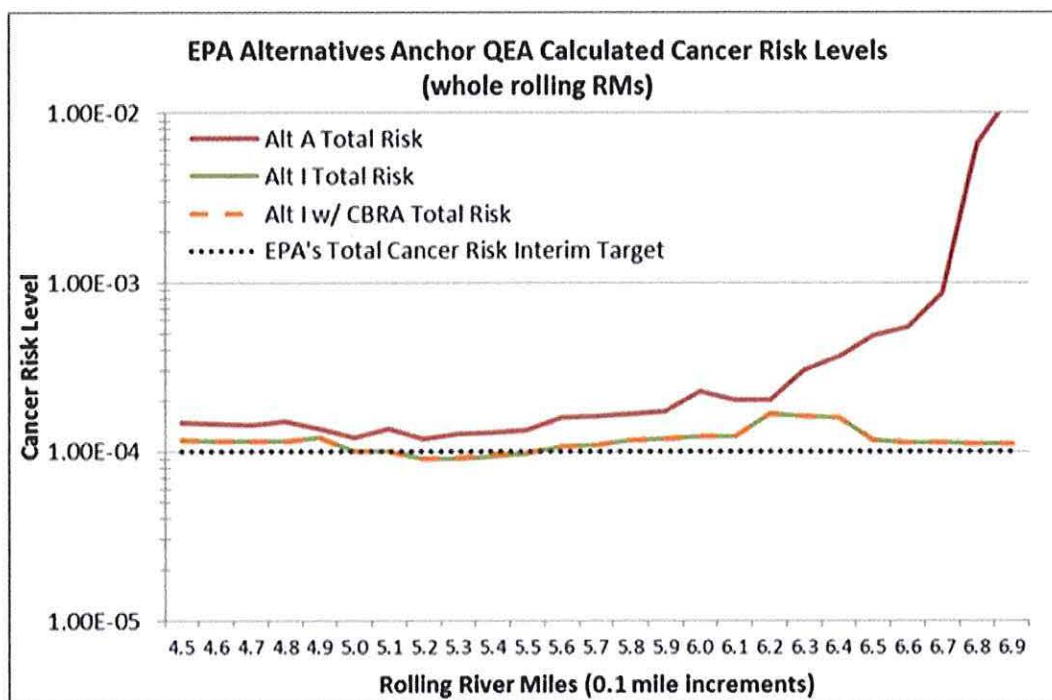


Figure 4 presents similar risks estimates for EPA's Alternative A total fish consumption risk (the red line) as well as two versions of Alternative I. (The first version is EPA's Alternative I with total PAH RALs applied in the navigation channel [green line] and the second version is Alternative I without PAH RALs applied in the navigation channel, with the CBRAs used instead [orange dashed line].) The total fish consumption risks represented by the two versions of Alternative I are so close as to be visually identical, even on a log scale.<sup>23</sup>

<sup>23</sup> Attachment 4 contains graphs similar to Figures 3 and 4, but isolated solely to the Navigation Channel per EPA's new transect approach for the FS. These navigation channel graphs show outcomes similar to the more appropriate whole river mile graphs shown here.



Figure 4. Whole Rolling River Mile Total Fish Consumption Cancer Risks Consistent with EPA's 2016 FS Appendix J with Comparison of EPA Alternative I and Alternative I with CBRAs.



Collectively, these figures demonstrate that, even if EPA's use of a shellfish consumption PRG as a surrogate for fish consumption had any scientific validity at all, EPA is adding an estimated \$62 million in navigation channel dredging targeted at PAHs that achieves no appreciable change in total fish consumption risk beyond the EPA/LWG CBRA approach. Rather, by the rules of EPA's own FS and Proposed Plan, PAH concentrations in the navigation channel on the basis of the CBRAs alone (or, for that matter, by no action Alternative A) meet the "interim targets," and "natural recovery is then the mechanism for further reducing contaminant levels to PRGs."

The CBRA approach is protective of benthic risk. Similarly, the multiple lines of evidence approach developed to evaluate benthic risk in the EPA-approved BERA, rather than the RALs, should define the areas for cleanup designed to address benthic risk. As discussed in greater detail in the LWG's comments on the Proposed Plan, the BERA identified benthic risk at approximately 4 to 8 % of the Portland Harbor site,<sup>24</sup> and the CBRA approach developed by EPA and the LWG for the FS through early 2015 mapped approximately 61 acres for remediation based upon benthic risk.<sup>25</sup> In the late stages of preparing the FS, however, EPA abruptly and without explanation abandoned the CBRA approach, and EPA's preferred alternative now identifies areas for cleanup based upon single point exceedance of a PRG. EPA's draft Final FS depicts benthic risk in approximately 1289 acres, almost 60% of the Site.<sup>26</sup> In other words, EPA's Proposed Plan targets about 1200 acres for cleanup that its approved BERA concludes present no risk to benthic communities. And even with this massive departure from its own

<sup>24</sup> BERA, p. 774.

<sup>25</sup> See Lower Willamette Group Comments on Portland Harbor Proposed Plan, September 6, 2016, pp. 6-8.

<sup>26</sup> Table 4.2-7.

risk assessment, EPA's preferred alternative fails to capture 16% of locations mapped through the EPA/LWG CBRA approach as presenting clear evidence of benthic toxicity.<sup>27</sup>

The ROD should direct that relevant information, including information collected in pre-remedial design or remedial design work, will be evaluated consistently with the BERA and the EPA/LWG CBRA approach to confirm and refine benthic risk areas for active remediation. EPA should adopt a remedial goal based on appropriate application and interpretation of both existing benthic toxicity tests and toxicity testing performed during remedial design.

NW Natural has invested considerable resources to evaluate site-specific conditions under the Gasco Consent Order. The May 2012 Gasco EE/CA evaluated multiple lines of evidence, including benthic toxicity bioassays, to delineate well-defined areas of benthic risk for active remediation.<sup>28</sup> The area identified through this process was approved by EPA for use in developing detailed site-specific remedial alternatives. This information should be carried forward into EPA's remedy selection, and the ROD should explicitly allow refinement of benthic risk areas through future toxicity testing at Gasco and elsewhere as remedial design proceeds.

2. *EPA should acknowledge that areas for active remediation and technology assignments selected for FS purposes will recognize existing upland source controls and will be refined during remedial design and implementation to allow site-specific and new information to optimize remedy effectiveness and reduce uncertainty.*

EPA's Sediment Guidance advises that the combination of technologies that will attain the best balance of risk reduction and cost effectiveness at any specific location is highly site-specific.<sup>29</sup> EPA's ROD must provide broad, governing remedial goals, but it should be structured to avoid the need for ROD amendments and ESDs by recognizing the gains achieved through upland source control and explicitly stating that sediment management areas and technology assignments will be refined and revised as appropriate using site specific and new data as it becomes available. And EPA's remedy selection should recognize the significant investment made by NW Natural in compliance with the Gasco Consent Order by incorporating site-specific information collected under this existing order and by honoring the terms of the Gasco Consent Order.

Recognize existing source control. EPA's selected remedy must recognize the gains made through DEQ's upland work by incorporating existing and committed groundwater and riverbank source controls. In a July 20, 2016 e-mail to the LWG, EPA confirmed that "[u]pland source control systems were not considered" in EPA's selection of a preferred alternative.<sup>30</sup> This assumption nullifies years of work and tens of millions of dollars invested at the Gasco upland site.

EPA's decision to assign remedial technologies at Gasco that ignore the documented performance of the upland hydraulic control and containment system installed under Oregon DEQ oversight and in close coordination with EPA is both inconsistent with the Gasco Consent Order and ignores scientific and engineering information provided to EPA. The Gasco Consent Order states that

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<sup>27</sup> See Lower Willamette Group Comments on Portland Harbor Proposed Plan, September 6, 2016, pp. 6-8

<sup>28</sup> See, Gasco Consent Order SOW, p. 27.

<sup>29</sup> *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* (EPA 2005) (hereafter, the "Sediment Guidance") p. 3-2.

<sup>30</sup> Koch email to Wyatt, July 20, 2016, Attachment 5, item 14.



Cleanup alternatives shall be evaluated in the context of upland groundwater source controls, which will be implemented by this time, including:

- Reviewing groundwater seepage rate reductions as measured or predicted for upland source control performance
- Apply the most up to date estimates of groundwater seepage rates and chemical concentrations (as measured or extrapolated) for evaluation of attenuation (i.e, MNR), capping, and dredging alternatives and their long term effectiveness
- Evaluating attenuation rate predictions for groundwater and TZW that will not be directly remediated by upland source controls.<sup>31</sup>

As documented in the May 2015 *Hydraulic Control and Containment System Capture Performance and Monitoring Plan* and the January 2015 *Groundwater Source Control Phase 1 Testing Data Summary and Analysis Report*, the hydraulic control and capture system is successfully meeting all objectives for the system and fully containing alluvial groundwater across the full length of the Gasco waterfront and the northern portion of the Siltronic waterfront.<sup>32</sup> DEQ's March 2016 *Portland Harbor Upland Source Control Summary Report* states that, with full scale operation of the hydraulic control and containment system, alluvial groundwater "is considered controlled, pending effectiveness demonstration, with a low potential for sediment recontamination."<sup>33</sup>

EPA's draft Final FS and the Proposed Plan, however, prescribe an "in-river reactive cap" for "all areas, including river banks, with known discharges of contaminated groundwater" and "in situ treatment ... in areas where groundwater plumes impact pore water." The FS and Proposed Plan identify Gasco as one such location.<sup>34</sup> EPA's Proposed Plan would therefore require NW Natural to include treatment amendments to all caps and residual cover materials in the navigation channel and future maintenance dredge areas, intermediate areas, shallow areas, and riverbank without regard to NW Natural's existing demonstrated control of alluvial groundwater, which both prevents offshore groundwater discharge from the uplands and precludes groundwater flux through any remaining contaminated sediments by pulling river water into the sediments. Neither EPA's June 2016 FS nor the Proposed Plan appear to contemplate the integration of HC&C system performance data in the future during remedial design.

EPA's unexplained retreat from a site-specific, technically sound decision framework that directly accounts for the performance of upland source controls to a generic approach that ignores detailed information developed by NW Natural and DEQ in close coordination with EPA is inconsistent with the Gasco Consent Order. NW Natural respectfully requests that EPA state in the ROD that technology assignments will be reevaluated during remedial design in a manner that includes comparative effectiveness using site specific data and procedures consistent with the Gasco Consent Order (as was completed in the Gasco EE/CA), including current conditions associated with existing upland groundwater source controls.

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<sup>31</sup> Gasco Consent Order SOW, p. 39.

<sup>32</sup> *Hydraulic Control and Containment System Capture Performance and Monitoring Plan* (Anchor QEA, May 2015); *Groundwater Source Control Phase 1 Testing Data Summary and Analysis Report* (Anchor QEA, January 2015).

<sup>33</sup> *Portland Harbor Upland Source Control Summary Report* (Oregon Department of Environmental Quality, March 2016) p. 69.

<sup>34</sup> Draft final FS, p. 1-5; Proposed Plan Figure 5.

Finalize technology assignment during remedial design based upon site-specific information. The Gasco Consent Order provides for evaluation of “a range of technologies including dredging, capping, and Monitored Natural Recovery (MNR). Alternatives will include combinations of technologies that are tailored to the physical, chemical and other conditions of the Site.”<sup>35</sup> By contrast, EPA’s Proposed Plan and the draft Final FS assign prescriptive technologies based upon generalized decision trees. EPA’s alternatives do not allow evaluation of the comparative effectiveness of various combinations of technologies applied within the same area of the site – the only difference among the EPA FS alternatives is the size of a single applied technology.<sup>36</sup> EPA guidance clearly recognizes that capping and dredging are applicable to a wide range of physical, chemical, and biological conditions. Disregarding the site-specific evaluation provided in the Gasco EE/CA and screening out either of these technologies by using FS-level assumptions and evaluations that do not account for site-specific variation is inappropriate and is likely to result in both less effective and less cost effective technology assignments.

The combination of technologies that will attain the best balance of risk reduction and cost effectiveness at any specific location is highly site-specific.<sup>37</sup> EPA’s remedy selection must allow for technology adjustment and refinement through the incorporation of the types of site-specific information that are provided in the Gasco EE/CA but were not carried forward by EPA into the draft Final FS and Proposed Plan. EPA has not provided any rationale for its decision not to import the more refined technology evaluations of the Gasco EE/CA, which were prepared in close coordination with EPA, into the FS or into the Proposed Plan.

As discussed in the LWG’s comments on technology assignments<sup>38</sup> and illustrated in Attachment 6 (Technology Assignment Decision Tree), subject to some general rules, EPA should finalize site-specific technology assignments through engineering evaluations that include consideration of site-specific or new information. Attachment 6 builds on an October 30, 2015 draft capping demonstration decision tree EPA provided to NW Natural in November 2015 and presents what NW Natural believes is an appropriate tool for EPA to use in refining technology assignments during remedial design. In February 2016, NW Natural submitted a technical memorandum proposing design processes for the evaluation of cap suitability at Gasco consistent with the October 30 decision tree.<sup>39</sup> EPA has not yet responded to this memorandum. NW Natural encourages EPA to issue a ROD that supports the kind of site-specific design processes contemplated by Attachment 6 and detailed in the February 2016 cap demonstration memorandum to assure that remedial activities will be effective and implementable at their specific locations and are cost effective.

The Gasco Sediments Site presents a good case study of the critical importance of considering site-specific detail when selecting technology assignments in cleanup areas. The Gasco EE/CA presents the type of detailed, site-specific analysis that EPA will ultimately have to grapple with in designing and implementing remedies across the large and diverse Portland Harbor Site, and EPA should use the EE/CA analyses in selecting a remedy for the Gasco Sediments Site in its Portland Harbor ROD. Here are a few examples of localized factors associated with Gasco that, presumably due to the scale of what EPA

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<sup>35</sup> Gasco Consent Order SOW, p. 6

<sup>36</sup> EPA June 2016 FS, p. 3-38.

<sup>37</sup> Sediment Guidance, p. 3-2

<sup>38</sup> Lower Willamette Group Comments on Portland Harbor Proposed Plan, September 6, 2016, pp. 42-43.

<sup>39</sup> Technical Memorandum, *Cap Demonstration Requirements – Gasco Sediments Site Cleanup Action* (AnchorQEA February 8, 2016), Attachment 7.



needs to accomplish harborwide, were not fully considered or integrated into EPA's Proposed Plan for Portland Harbor:

- Future source material: EPA's identification in the Proposed Plan of "globules or blebs" of NAPL as "source material" constituting "principal threat waste" (PTW) at the Gasco Sediments Site<sup>40</sup> is inconsistent with the more specific definition of "potential future source of risk material" in Section 3.2 (RAO 1) of the Gasco Consent Order Statement of Work through the delineation of "substantial product."

Section 3.6.2.1 of the Gasco SOW states:

Areas with substantial presence of product in sediments is a line of evidence related to potential mobility of chemicals in the future, and thus related to risks identified in the BLRA. Visual observations in sediment cores shall be the primary parameter used for this line of evidence. As noted above, the term "substantial" product is intended to 1) target product that is related to potential future mobility and 2) indicate a preference for removal as defined by RAO #1. The definition of substantial product does not include every incidence of product observation at the site.

Section 3.6.2.1 goes on to provide more than a page of detail on the precise physical characteristics of material that EPA will consider sufficiently mobile to constitute source material. Based upon this definition, NW Natural has conducted multiple EPA-approved field investigations at a cost of several million dollars to delineate the location of "substantial product" at the Gasco Sediment Site. These investigations were used to complete detailed and site-specific remedial alternative evaluations in the Gasco EE/CA.

The draft Final FS does not explain why EPA has apparently abandoned the detailed site-specific definition of "substantial product" developed using site-specific technical details and risk based-considerations at the Gasco Sediment Site and committed to by EPA in the Gasco Consent Order. In the absence of any technical justification, and given the substantial resources NW Natural has put into complying with EPA's original direction on the identification of potential future source material, EPA's change of course to make a remedy selection based generically on "globules and blebs" is both legally indefensible and a significant disincentive to voluntary early action by responsible parties.

EPA should also acknowledge that EPA and NW Natural have put significant effort and resources into delineating the extent of "substantial product" at Gasco for the purpose of making site-specific decisions about the degree of risk reduction to be achieved through removal. Gasco Consent Order RAO 1 provides only a "preference for removal" of substantial product; removal is not required where "the costs of such removal are clearly disproportionate to the degree of risk reduction to be attained through physical removal as compared to other remedial options for the same material." The prescriptive removal and

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<sup>40</sup> Proposed Plan, p. 14. See also, draft Final FS p. 3-3

treatment of all NAPL<sup>41</sup> in the absence of any cost effectiveness evaluation is inconsistent with both the Gasco Consent Order and the National Contingency Plan.<sup>42</sup>

- Remediation waste. EPA's Proposed Plan and the draft Final FS identifies a category of remediation waste called "Waste or Media Containing Waste that May Warrant Additional Management."<sup>43</sup> EPA states that "Waste with this designation may be specially managed as a non-hazardous waste at a Subtitle C facility based on the exceedance of TCLP criteria for [Manufactured Gas Plant (MGP)]-related constituents and/or special considerations such as worker safety and equipment decontamination. However, if the material is treated and TCLP criteria are no longer exceeded after treatment, it may be disposed of in a RCRA Subtitle D facility."<sup>44</sup>

NW Natural agrees that MGP-related remediation waste that exceeds TCLP criteria at the time it leaves the site will be disposed of as non-hazardous waste at a Subtitle C facility. This material is identified as "Special Waste" under the Gasco Consent Order.<sup>45</sup> To the extent, however, that EPA's draft Final FS and Proposed Plan indicate that it may require MGP-related remediation wastes that do not exceed TCLP criteria to be disposed of at a Subtitle C facility based on other "special considerations," that requirement would be inconsistent with the Gasco Consent Order, which provides

The method to determine that MGP-related material should be managed as a Special Waste shall be based on the absence of TCE and associated CVOC chemicals and exceedance of TCLP criteria for any MGP-related constituent. If TCLP criteria are exceeded at the time the material leaves the Site, then the material shall be designated Special Waste and transported to a Subtitle C facility. If not, the material would be disposed of as Cleanup Material at a Subtitle D facility [permitted to accept the material]. This method applies to both untreated and post treatment materials, if treatment is proposed. Consequently, an untreated material may meet this definition, but, upon treatment may be determined to no longer meet this definition. In the event that treatment, including treatment in barges, changes the definition, the material would no longer be designated a Special Waste.<sup>46</sup>

The draft Final FS goes on to state that EPA is assuming "for FS cost purposes" that Gasco remediation wastes EPA describes as "PTW NAPL/NRC ... would exceed the TCLP criteria and would need cement-based solidification treatment prior to disposal in a Subtitle C disposal

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<sup>41</sup> Proposed Plan p. 26.

<sup>42</sup> See, e.g., *A Guide to Principal Threat and Low Level Threat Wastes* ("The selection of an appropriate waste management strategy is determined solely through the remedy selection process outlined in the NCP (i.e. all remedy selection decisions are site-specific and must be made on a comparative analysis of the alternatives using the nine criteria in accordance with the NCP). Independent of the expectations, selected remedies must be protective, ARAR-compliant, cost-effective, and use permanent solutions or treatment to the maximum extent practicable.")

<sup>43</sup> Proposed Plan, p. 31; draft Final FS p. 3-29.

<sup>44</sup> Draft Final FS p. 3-29.

<sup>45</sup> See Gasco Consent Order SOW at p. 33.

<sup>46</sup> *Id.* Material that contains F002 waste from the adjacent Siltronic facility will be managed as a listed hazardous waste and disposed of at a Subtitle C facility.



facility.”<sup>47</sup> In fact, based upon data collected to support remedial design, only very limited areas of the Gasco Sediments Site have the potential to exceed TCLP criteria; only three samples collected from the Gasco Sediments Site contained benzene concentrations high enough to potentially require designation as “Special Wastes” at the time of any initial physical removal.<sup>48</sup>

NW Natural therefore respectfully requests that EPA clarify that, consistent with the Gasco Consent Order (and text earlier in the same paragraph in the draft Final FS), material that either does not exceed TCLP criteria or that is treated so that TCLP criteria are not exceeded may be disposed of in an appropriately permitted Subtitle D facility.

- Prescriptive sheet pile water quality controls. EPA’s draft Final FS states that “Engineered rigid control measures (such as sheet piles) may minimize NAPL and sediment releases outside of the sheet pile enclosed work area. These measures should be incorporated into any remediation alternative involving the presence of NAPL.”<sup>49</sup>

The Gasco Consent Order required NW Natural to “evaluate the short term risks ... posed by different dredge methods ... and the installation and removal of various containment systems (i.e. sheet pile and coffer dam).”<sup>50</sup> The Gasco EE/CA did so, and the findings of that evaluation are detailed and updated in a technical memorandum enclosed with these comments.<sup>51</sup>

In summary, site-specific engineering evaluations determined that use of sheet pile containment at the Gasco Sediment Site would only be partially effective at containing NAPL and dissolved contaminant releases from the containment area. Sheet piles do not create a water tight barrier, and releases have been observed at other EPA-managed cleanup sites (such as the Hudson River) using this technology. Further, due to engineering constraints (including water depth) at the Gasco Sediment Site, only about half of the NAPL can be surrounded by sheet pile containment. The limited amount of nearshore sheet pile containment that could feasibly be installed would, however, add approximately \$40 million to response costs while significantly increasing implementation risk. Short term risks associated with sheet pile include:

1. Penetration of contamination along the containment configuration to much deeper depths would leave stranded contamination following removal of the sheet piles and lead to surface releases of contamination upon removal of the sheet piles;
2. Greatly increased construction durations (at least 2 years) and associated construction impacts;
3. Temporary impoundment of a large volume of water in which construction activities could create substantially concentrated contaminant loads, resulting in adverse impacts upon release when containment is removed;

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<sup>47</sup> EPA draft final FS at p. 3-29.

<sup>48</sup> *Final Project Area Identification Report and Data Gaps QAPP, Gasco Sediments Site, Anchor QEA* (July 2010), Table 13

<sup>49</sup> Draft Final FS, p. 3-24.

<sup>50</sup> Gasco Consent Order, p. 6.

<sup>51</sup> See, *Critique of Portland Harbor Proposed Plan Prescriptive Requirement of Sheet Pile Wall Installation Around NAPL* (AnchorQEA, September 2016), Attachment 8.

4. Potentially significant health and safety risks for construction workers; and
5. Scour around the perimeter of the containment that could cause structural failure and mobilization of eroded sediments.

Again, EPA should finalize technology assignments, including water quality controls, through site specific remedial design engineering evaluations such as those contemplated by (and in progress under) the Gasco Consent Order.

- Riverbank remediation. The Proposed Plan assigns removal and capping at sediment management areas “projected” into river banks, including the river bank at Gasco, regardless of the actual concentrations of any contaminants in the riverbank soils or the current conditions of the shoreline (e.g., presence of structures, armored, vegetated, etc). The Proposed Plan does not account for upland work already performed by NW Natural at the Gasco facility pursuant to its DEQ Voluntary Agreement and in close coordination with EPA. The Proposed Plan also does not consider any of the detailed river bank evaluations and associated remedial alternatives evaluated in the Gasco Sediments Site EE/CA.

EPA’s presumptive riverbank remedy is not supported by the BLRAs and prevents meaningful comparison of the performance of remedial technologies that may perform equally effectively. EPA does not appear to have given any consideration to the range of technology assignments developed in coordination with EPA and evaluated along different portions of the Gasco riverbank in the EE/CA using site-specific data and evaluations. And EPA does not acknowledge or account for known impacts that will occur to existing upland structures and existing and potential future upland source control structures, as shown in Attachment 9. EPA’s presumptive riverbank remedy would result in millions of dollars of damage to or outright destruction of existing upland structures, including the extensive groundwater source control system, and undo years of work by NW Natural and DEQ to control the discharge of contaminated groundwater to the river.

Remedies must be cost-effective. Ultimately, the consequence of EPA’s swerve away from the BLRAs, coupled with its abandonment of site-specific considerations in the evaluation and assignment of technologies, is the selection of extremely costly remedies that take longer to complete while achieving little or no additional risk reduction.

Figures 5 and 6 compare the duration<sup>52</sup> and cost<sup>53</sup> of EPA’s alternatives in the area of the Gasco Sediment Site to the duration and cost of the alternatives evaluated in the Gasco EE/CA. Figure 5 shows

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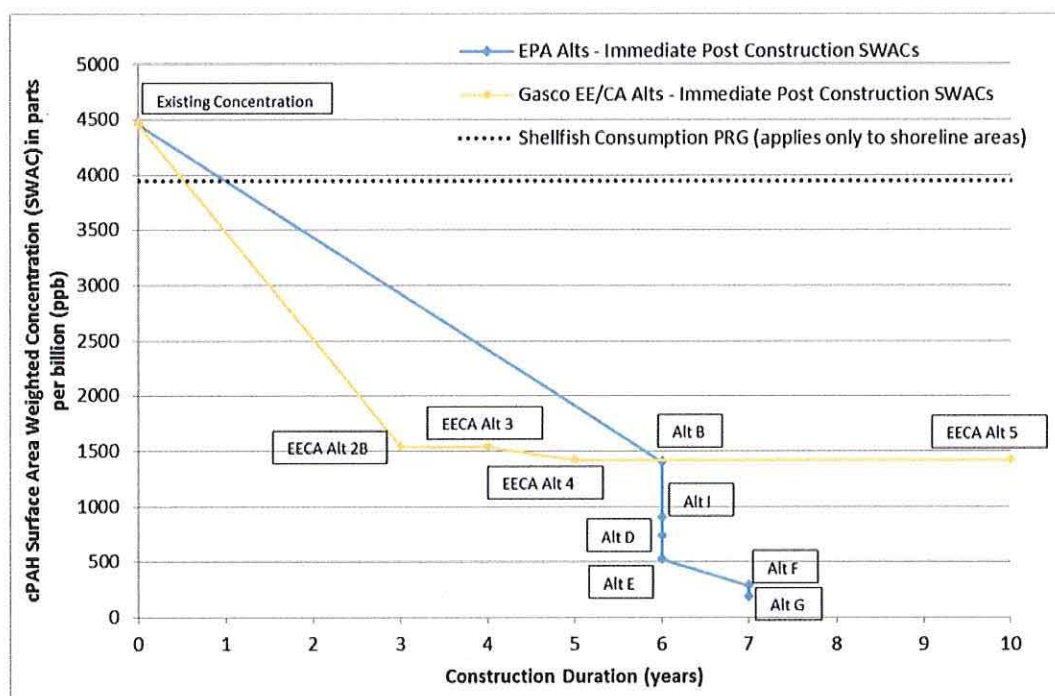
<sup>52</sup> Durations for the portion of EPA’s alternatives constructed at Gasco were extrapolated from 2016 draft Final FS information on Site-wide alternatives and adjusted for more realistic dredging rates (e.g., 12 hour/day construction). Durations are similar across EPA alternatives because EPA’s dredge volumes do not vary substantially between alternatives.

<sup>53</sup> EPA did not provide SMA or SDU specific cost estimates. Cost estimates in these comments were prepared by Anchor QEA consistent with the LWG’s August 29, 2016 Partial Comments on Portland Harbor Proposed Plan, incorporated by reference herein. Because sheet pile containment is proposed only at the Gasco and Arkema sites, and because the volume of proposed dredging EPA’s preferred alternative proposes at the Gasco Sediments Site is among the highest of any area within the Portland Harbor, EPA’s underestimation of harborwide response costs is proportionally more significant as applied to the Gasco Sediment Site. Based upon EPA’s estimated dredge volumes and prescriptive technology and treatment assignments, and using the LWG cost estimating methodology, response costs at Gasco for EPA’s preferred alternative would be about three times EPA’s estimate (as best we can



that all EE/CA alternatives (other than the no action alternative) would achieve the shellfish consumption PRG evaluated on a whole river mile scale consistent with the BHHRA immediately after construction and as much as three years earlier than EPA's preferred alternative.<sup>54</sup> Figure 6 shows that EPA's preferred alternative would not only take longer but would cost considerably more (about \$350 million) than the EE/CA recommended alternative with no additional environmental benefit.

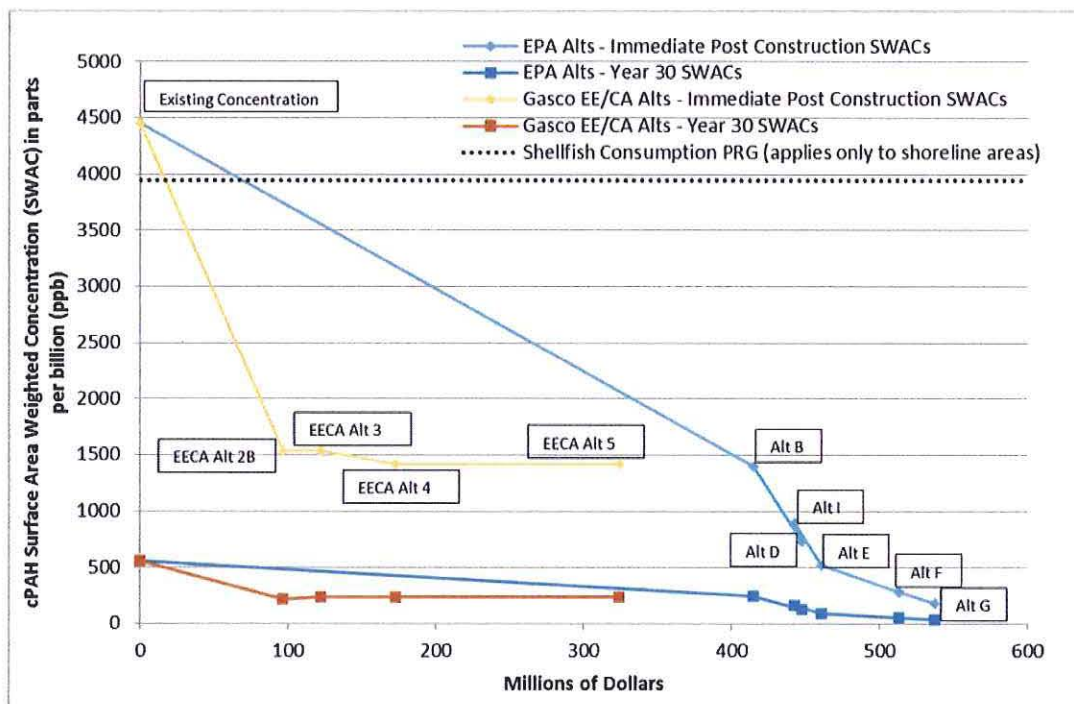
**Figure 5. EPA 2016 draft Final FS and Gasco 2012 draft EE/CA Alternative Durations and Immediate Post Construction cPAH SWACs for Whole River Mile 6 to 7.**



tell given EPA's failure to break down its costs by SDU or SMA). Due to the same flawed assumptions, EPA's construction durations for Gasco are also underestimated by a factor of two to three (from 2 to 7 years).

<sup>54</sup> River Mile 6 to 7 has some of the highest assumed current condition cPAH SWACs; therefore, this conclusion would not change if a different river mile were presented in these graphs.

**Figure 6. EPA 2016 draft Final FS and Gasco 2012 draft EE/CA Alternative Costs, Immediate Post Construction cPAH SWACs, and Estimated cPAH SWACs 30 years after Construction Start for Whole River Mile 6 to 7.**



Similarly, Figure 7 shows that all EE/CA alternatives (other than no action) would achieve concentrations equivalent to the cPAH RAO1 “interim target” of  $1 \times 10^{-5}$  cancer risk<sup>55</sup> (adjusted for the site use factor assumed in the BHHRA) within the west shoreline half river mile between RM 6 and 6.5W immediately after construction.<sup>56</sup> Therefore, “natural recovery is then the mechanism for further reducing contaminant levels to PRGs.”<sup>57</sup> Indeed, cPAH SWACs at year 30 are expected to be at or approach the RAO1 PRG (and roughly equivalent to SWACs for EPA alternatives) for all of the EE/CA alternatives.<sup>58</sup>

<sup>55</sup> EPA does not explain, and we do not understand, why EPA chose a  $10^{-5}$  interim target for RAO1 and a  $10^{-4}$  interim target for RAO2.

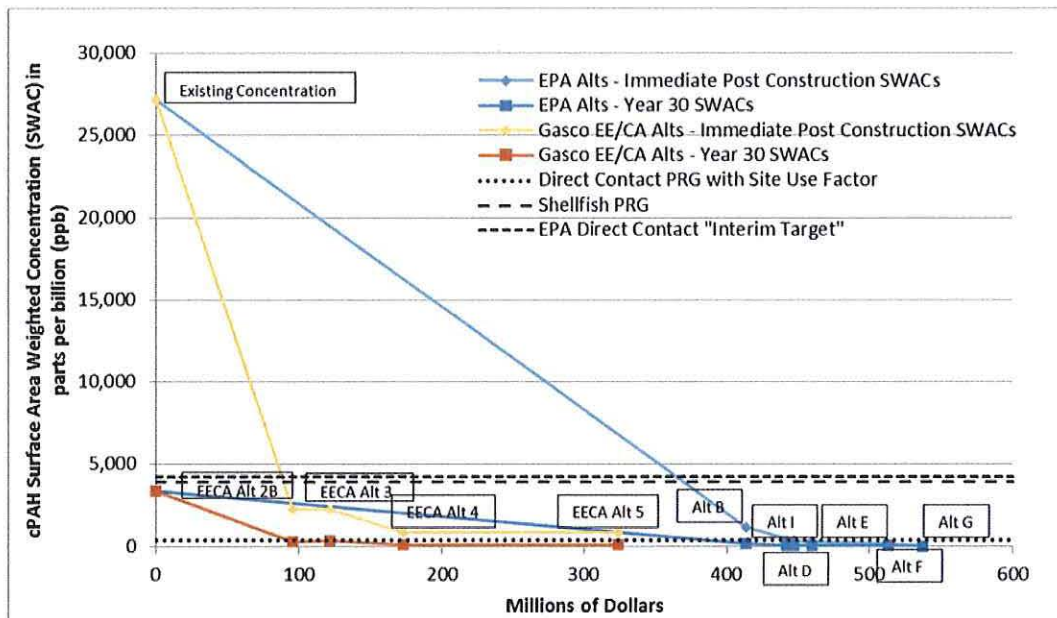
<sup>56</sup> EPA used a half river mile exposure scale in the BHHRA for sediment direct contact and shellfish consumption. The RM 6.0 to 6.5W shoreline half river mile was selected for this illustration because it has some of the highest assumed current condition cPAH SWACs. Therefore, the analysis would not change if other west shoreline half mile segments were evaluated.

<sup>57</sup> Proposed Plan, p. 51.

<sup>58</sup> Future SWAC cPAH decreases were estimated by conducting a simple half-life calculation, as described at page 55 of the LWG’s Comments on the Proposed Plan. The half-life of 10 years used in this calculation is consistent with EPA’s assumed expectation in the 2016 FS and Proposed Plan that PRGs will be met in about 30 years.



**Figure 7. EPA 2016 draft Final FS and Gasco 2012 draft EE/CA Alternative Costs, Immediate Post Construction cPAH SWACs, and Estimated cPAH SWACs 30 years after Construction Start for West Shoreline Half River Mile 6 to 6.5.**



In summary, as is apparent from these figures, all of the EE/CA alternatives are expected to meet the RAO1 and RAO2 PRGs within the 30 year reasonable time frame established by EPA's draft Final FS and Proposed Plan. Therefore, the much higher cost associated with EPA's alternatives is clearly disproportionate. Figures 8 (whole river mile) and 9 (west shoreline half river mile) illustrate that, although all alternatives reach acceptable risk levels within 30 years, EPA's alternatives would cost as much as \$100,000 dollars more for each part per billion reduction in SWAC than the EE/CA alternatives.

Figure 8. Cost per Each Part Per Billion in cPAH SWAC Reduction for EPA 2016 draft Final FS and 2012 Gasco EE/CA Alternatives (SWACs for Whole River Mile 6 to 7).

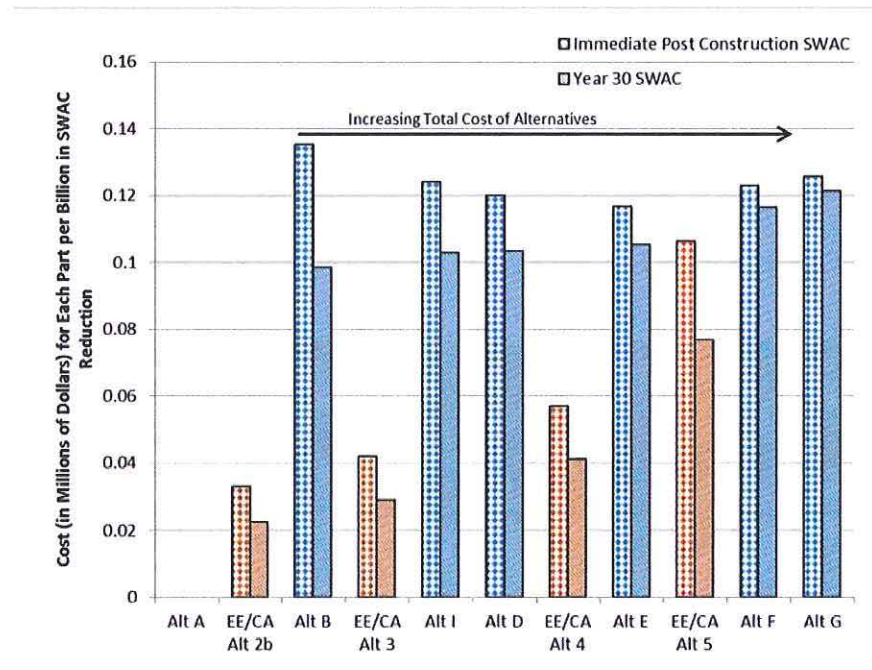
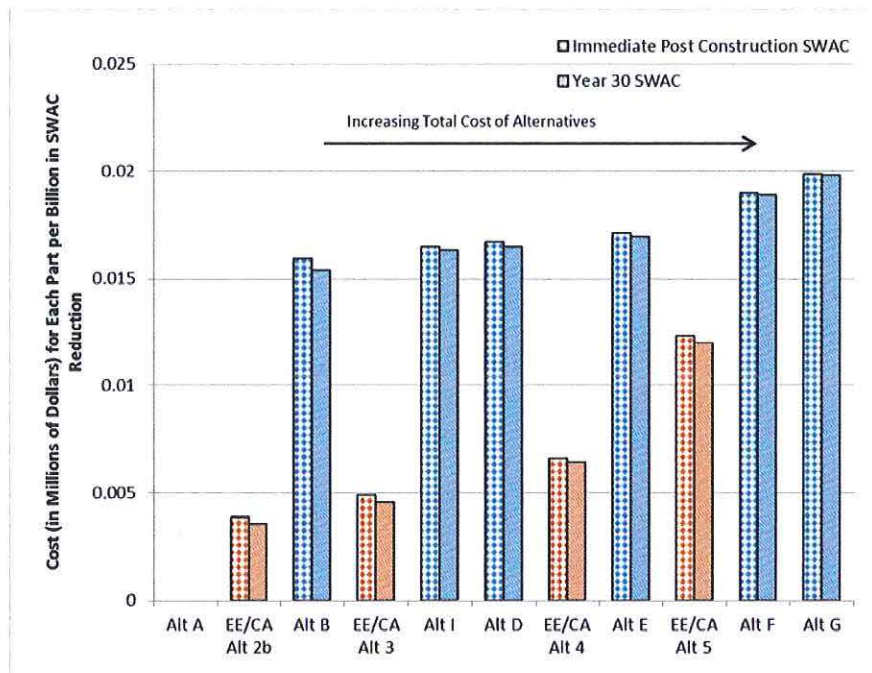


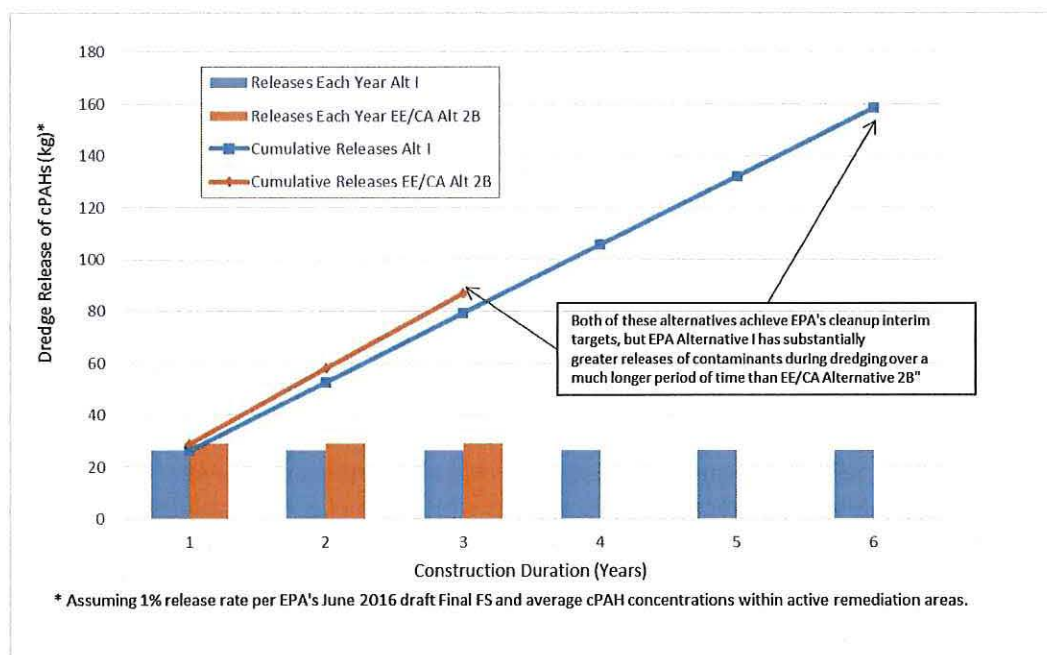
Figure 9. Cost per Each Part Per Billion in cPAH SWAC Reduction for EPA 2016 draft Final FS and 2012 Gasco EE/CA Alternatives (SWACs for West Shoreline Half River Mile 6 to 6.5).





Finally, the longer, more dredging intensive cleanup preferred by EPA brings with it increased short term risk as well as increased cost. Figure 10 compares the effects of contaminants released by EPA's preferred alternative to the Gasco EE/CA recommended alternative (Alternative 2b). Figure 10 shows that significantly higher releases of cPAHs during construction would occur with Alternative I than with EE/CA Alternative 2B and would continue over a longer duration resulting in higher short-term risks.

**Figure 10. Estimated Dredge Releases of cPAHs for EPA 2016 FS Alternative I and Gasco 2012 EE/CA Alternative 2B.**



3. *EPA should prioritize areas to achieve significant risk reduction quickly by breaking the site into operable units.*

EPA should prioritize areas of the site where cleanup will achieve significant risk reduction quickly through the identification of operable units that can move into RD/RA soon after the ROD. EPA has already identified a number of these areas, including the Gasco Sediments Site. Remediation in operable units is a key CERCLA program management principle supporting EPA's "bias for action." The National Contingency Plan provides,

(ii) *Program management principles.* EPA generally shall consider the following general principles of program management during the remedial process:

(A) Sites should generally be remediated in operable units when early actions are necessary or appropriate to achieve significant risk reduction quickly, when phased analysis and response is necessary or appropriate given the size or complexity of the site, or to expedite the completion of total site cleanup.<sup>59</sup>

<sup>59</sup> 40 C.F.R. §300.430(a)(1)(ii).

The preamble to the 1990 revisions to the NCP explains,

A bias for action is consistent with EPA's long-standing policy of responding by distinct operable units at sites as appropriate, rather than waiting to take one consolidated response action. The 1985 NCP originally codified this policy that remedial actions may be staged through the use of operable units.

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Consistent with the bias for action principle in today's rule, EPA will implement remedial actions in phases as appropriate using operable units to effectively manage site problems or expedite the reduction of risk posed by the site.

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EPA supports the operable unit concept as an efficient method of achieving safer and cleaner sites more quickly while striving to implement total site cleanups. Although the selection of each operable unit must be supported with sufficient site data and alternatives analyses, EPA allows the ROD for the operable unit to use data and analyses collected from any RI/FS performed for the site.<sup>60</sup>

EPA's decision to approach other large and diverse Superfund sites as a monolithic whole has been criticized by the scientific community. A 2005 report by the National Academies of Science reviewing EPA's work in the Coeur d'Alene River Basin concluded that EPA's decision to treat a large and diverse area as a single operable unit resulted in a slower, less effective and more uncertain cleanup:

By combining these different problems into one OU and subjecting them to the process established in the NCP, EPA must attempt to answer all the questions for all the problems before it can attempt to remedy any of them. As a result, the agency must delay action on addressing the more tractable problems until it has all the information it needs to decide what to do about those that are less easily addressed, or, alternatively, it must propose remedies for some of the problems with inadequate information. \*\*\* Although these considerations also exist for smaller, less complex Superfund sites, the complexity of these large geographically diverse sites like the Coeur d'Alene River basin dramatically increases the difficulty in developing workable remedies for every problem before beginning action on any of them.<sup>61</sup>

Breaking up the site into operable units would allow EPA to work with subsets of the large number of potentially responsible parties at Portland Harbor to get cleanup in those areas started soon after the ROD, while less well-defined areas or areas of lower risk proceed on a parallel path through further baseline assessment and monitoring that allows the risk reduction achieved through early cleanups to inform subsequently scheduled cleanups. Contemporaneous initiation of cleanup at some operable units while others undergo additional assessment is entirely consistent with the NCP:

While the bias for action promotes multiple actions of limited scale, the program's ultimate goal continues to be to implement final remedies at sites. The scoping section of today's rule has been amended to make clear that the lead agency shall conduct strategic planning to identify the optimal set and sequence of actions necessary to address the site problems. Such actions may include, as appropriate, removal actions, interim actions and other types of operable units. Site management planning is a dynamic, ongoing, and informal strategic planning effort that

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<sup>60</sup> 55 Fed. Reg. 8666, 8704-05.

<sup>61</sup> National Academy of Science, *Superfund and Mining Megaprojects: Lessons Learned from the Coeur d'Alene River Basin* (2005), pp. 420-21.



generally starts as soon as sites are proposed for inclusion on the NPL and continues through the RI/FS and remedy selection process and the remedial design and remedial action phases, to deletion from the NPL.<sup>62</sup>

EPA's Sediment Guidance recommends exactly this approach: "Project managers may also consider separating the management of source areas from other, less concentrated areas by establishing separate operable units (OUs) for the site."<sup>63</sup>

NW Natural has repeatedly indicated its commitment to move forward with an appropriate final remedy at Gasco "expeditiously following issuance of a Record of Decision for the Portland Harbor Superfund Site."<sup>64</sup> We have the information now to make good decisions about the Gasco cleanup, and the Gasco Consent Order continues to provide a solid framework for doing so. Identifying the Gasco Sediment Site as a separate operable unit in the Portland Harbor ROD would allow us to move forward at Gasco without waiting for EPA to complete the multiple years of pre-remedial design activities outlined by the Proposed Plan.<sup>65</sup>

4. *EPA should further apply adaptive management principles by selecting higher Remedial Action Levels so that site cleanup can focus on areas of highest potential risk and minimize disruption to the river system.*

EPA's Sediment Guidance recommends the use of adaptive management "especially at complex sediment sites to provide additional certainty and information to support decisions."<sup>66</sup> As EPA has explained elsewhere,

Adaptive management is a process that allows a project management team to adapt and optimize project activities as they are implemented to account for new information, changing conditions, and additional opportunities such as innovative technologies. Adaptive management is intended to facilitate a process that endeavors to minimize cost and maximize the environmental benefits achieved by the actions taken.<sup>67</sup>

EPA's ROD should select Alternative B RALs and the 2015 CBRA approach consistent with the BLRAs as the basis for initiating cleanup at Portland Harbor. Operable units can then be established at those areas presenting the most significant risks, and parties can move expeditiously to design and

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<sup>62</sup> 55 Fed. Reg. at 8706. See also, 53 Fed. Reg. at 51423: "Where problems are reasonably severable, phased responses implemented through a sequence of operable units may promote more rapid risk reduction."

<sup>63</sup> EPA, *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites*, p. 2-22.

<sup>64</sup> Gasco Consent Order, p. 21, ¶ 22.

<sup>65</sup> Proposed Plan, p. 38 and note 8 ("Year 0" for all alternatives includes 3 to 5 years of initial conditions monitoring, construction of on-site material handling and treatment facilities, pre-remedial design investigations, start up activities and mobilization, and is the first year of construction).

<sup>66</sup> Sediment Guidance, p. 2-22. See also, *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites*, OSWER 9285.6-08 (February 2002), p. 6 ("At complex sediment sites, site managers should consider the benefits of phasing the remediation... In some cases, it may be appropriate to take an interim action to control a source, or remove or cap a hot spot, followed by a period of monitoring in order to evaluate the effectiveness of these interim actions before addressing less contaminated areas."); *Guidance on Expediting Remedial Design and Remedial Action* (OSWER 9355.5-02 August 1990) ("Phasing is the division of a project into meaningful remedial work elements that can be implemented on different schedules resulting in acceleration of the remedial design and remedial action.").

<sup>67</sup> EPA, *Statement of Basis for EPA's Proposed Remedial Action for the Housatonic River, "Rest of River"*.

implementation. As shown in Figure 11 – Iterative Remedial Design/Remedial Action Approach, this approach facilitates remedy design and implementation at prioritized operable units while additional information is being collected site-wide or at other operable units.

Information developed through baseline sampling work, through remedial design and, eventually, remedy implementation and post-implementation monitoring, would be used to refine SMA boundaries for later operable units, evaluate the effectiveness of remedial approaches and technologies, and reduce uncertainty concerning the rate and effectiveness of natural recovery. Ongoing monitoring would allow EPA to use information generated from areas of early remedy implementation to adjust or refine its approach in areas of later cleanup.<sup>68</sup> “The intent of the adaptive management process is to guide the collection of valuable information so that the most effective cleanup is achieved for the lowest cost.”<sup>69</sup>

Designating and prioritizing operable units and adopting this approach would allow EPA to deploy EPA resources efficiently as well as to leverage additional resources that might be provided by other agencies, such as Oregon DEQ.<sup>70</sup>

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<sup>68</sup> See, e.g., 2013 *Bunker Hill Mining and Metallurgical Complex Superfund Site Superfund Cleanup Implementation Plan*, 2012-2022 (February 20, 2013) (“Adaptive management ... is a process wherein decisions are made as part of an ongoing science-based process. A key component of the success of the adaptive management process is refinement of the implementation process and remedial approaches as new information becomes available that clarifies uncertainties regarding the understanding of a site, the effectiveness of the remedial approaches and technologies used, and the responses of environmental receptors to changes in contaminant concentrations, ecological conditions, and habitat. \*\*\* Within the context of the cleanup actions, adaptive management simply means that EPA will implement specific cleanup actions included in the remedies for OUs 1, 2, and 3, monitor the effectiveness of those actions to determine whether cleanup goals are being achieved, and make adjustments to future cleanup actions to benefit from the information gained through the effectiveness monitoring.”

<sup>69</sup> *Id.* at p. 7-3.

<sup>70</sup> It is no secret that EPA is significantly resource-challenged. A March 2010 GAO report states:

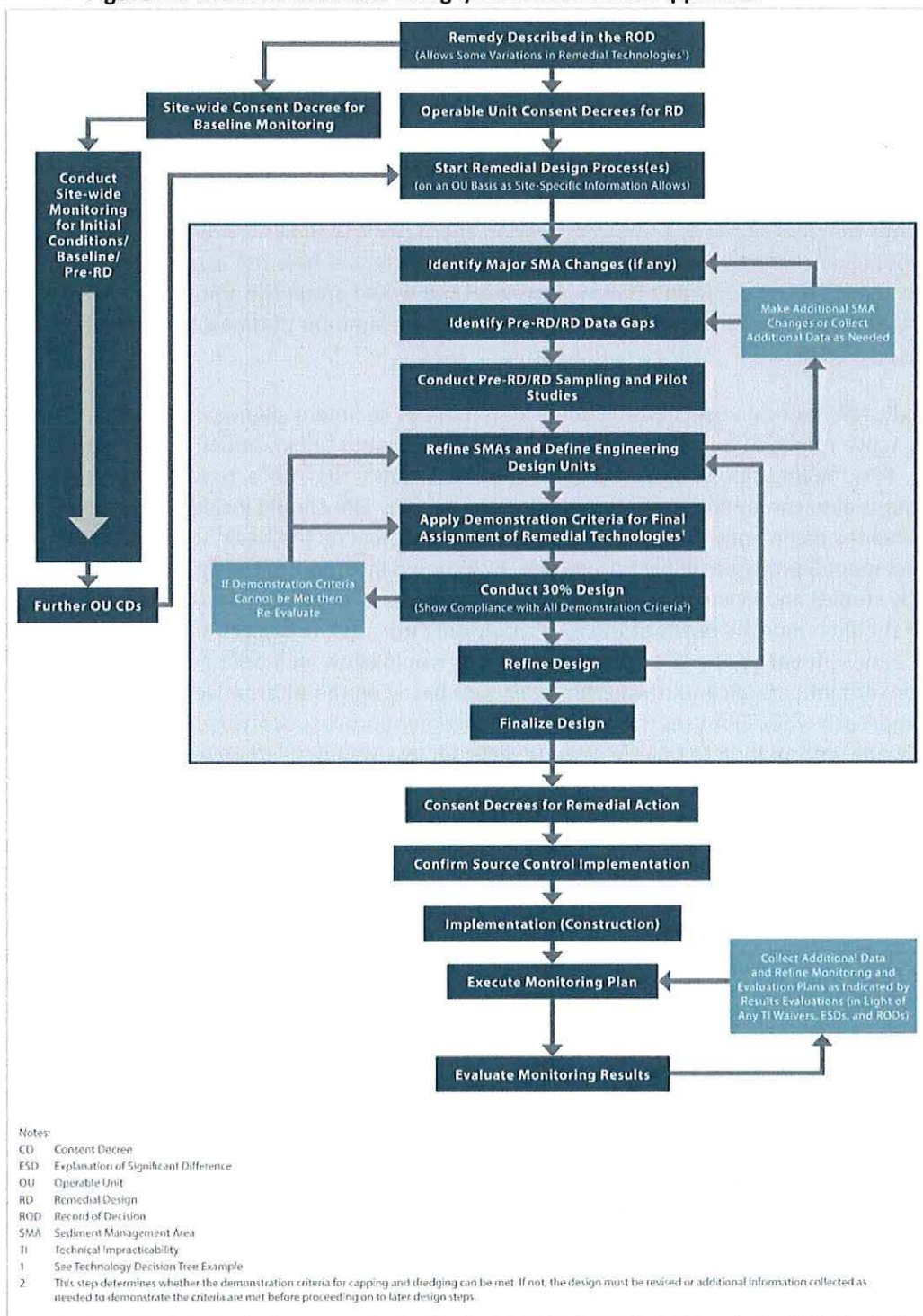
In 2009, EPA officials told us the only workload analysis that they had conducted in recent years was an examination of the workload for the Superfund program completed in 2008. The resulting report said it remained a challenge to manage the expectations for the Superfund program under the allocation of personnel at the time. One finding in the report was that, “...given the allocation of work years, the time required to complete the remedial portion of the program for national priority sites was likely to be in excess of 70 years and well beyond the expected planning horizon for many sites.” Officials stated that they used the analysis in some instances to divert efforts from administrative functions to implementation of the cleanup program, share work among regions, and plan programs. However, the analysis was not used for a centrally managed reallocation effort by the office that manages the Superfund program.

*Workforce Planning: Interior, EPA, and the Forest Service Should Strengthen Linkages to Their Strategic Plans and Improve Evaluation* (GAO-10-413)

The problem appears likely to get worse before it gets better: during a June 2016 ABA Superfund program, Jim Woolford identified EPA staff turnover as a significant problem for large Superfund sites, both from a project knowledge and experience standpoint, citing agency data suggesting that as much as 60% of the EPA workforce will become eligible for retirement within the next ten years. Among other measures to address EPA workforce issues, GAO has recommended better coordination by EPA with its federal and state partners to “more effectively leverage limited resources.” GAO concluded, “[g]iven the federal deficit and the government’s long-term fiscal challenges, it is imperative that EPA improve coordination with its federal and state partners to reduce



**Figure 11. Iterative Remedial Design/Remedial Action Approach.**



administrative burdens, redundant activities, and inefficient uses of federal resources.” *Environmental Protection Agency: Major Management Challenges* (GAO-11-422T, March 2011).

## Conclusion

NW Natural remains committed to its promise to EPA in the 2009 Gasco Consent Order to move forward with an appropriate final remedy at Gasco "expeditiously following issuance of a Record of Decision for the Portland Harbor Superfund Site." A thoughtful review of the evidence before EPA, including the detailed technical evaluations performed for EPA by NW Natural under the Gasco Consent Order, demonstrates that less aggressive, shorter duration alternatives than EPA's preferred alternative, are protective, would be as effective at reducing risks identified in the baseline risk assessments, would result in less short term risk to people and the environment, and would attain the amount of risk reduction achievable through sediment remedies in about the same amount of time and at far less cost than EPA's preferred alternative.

Accordingly, NW Natural urges EPA to issue a ROD that ties sediment cleanup levels and requirements for active remediation only to areas where significant risks are identified in the baseline risk assessments. EPA should use the EPA/LWG CBRA approach, rather than RALs, to address any risk associated with petroleum contamination in the navigation channel. EPA should include a decision framework that finalizes technology assignment during remedial design on the basis of site-specific information; Attachment 6 provides such a framework. EPA should incorporate the findings of the detailed and costly studies and evaluations NW Natural has performed under the Gasco Consent Order into the ROD and should honor the terms of the Gasco Consent Order as the project moves into remedial design. Finally, breaking the site into operable units would allow well-defined areas such as Gasco to move forward into design and toward final cleanups based on the Alternative B RALs and the EPA/LWG CBRA approach while EPA uses the adaptive management process described in Figure 2 to develop and apply new information to finalize cleanup plans for less well-defined areas of the site.

NW Natural appreciates EPA's consideration of these comments.

Sincerely,



Bob Wyatt  
Director, Legacy Environmental Program  
NW Natural



**Attachments to NW Natural September 6, 2016 Comments on EPA's June 8, 2016 Proposed Plan and  
draft Final Feasibility Study for the Portland Harbor Superfund Site**

<b>ATTACHMENT NUMBER</b>	<b>DOCUMENT DATE</b>	<b>DOCUMENT TITLE / DESCRIPTION</b>
<b>1</b>		Site Vicinity Map and Interim Project Area Boundary Gasco Sediments Site
<b>2</b>	September 2016	Technical Memorandum – NW Natural Critique of EPA PRGs and RALs Portland Harbor Feasibility Study
<b>3</b>	10/22/2010	Metabolism of PAHs by Teleost Fish – Scientific Findings, Joh E. Stein, Ph.D., Deputy Director Northwest Fisheries Science Center, NMFS
<b>4</b>		Total Fish Consumption and cPAH Cancer Risks Consistent with EPA's 2016 FS Appendix J for Select EPA Alternatives and Alternative I with CBRAs. Navigation Channel Transect Rolling River Miles.
<b>5</b>	07/20/2012	EPA Email to LWG, (Koch to Wyatt) Re: Request for Clarification
<b>6</b>	8/31/2016	Technology Assignment Decision Tree
<b>7</b>	02/08/2016	Technical Memorandum, Cap Demonstration Requirements – Gasco Sediments Site Cleanup Action, Anchor QEA
<b>8</b>	September 2016	Critique of Portland Harbor Proposed Plan Prescriptive Requirement of Sheet Pile Wall Installation Around NAPL, Anchor QEA
<b>9</b>		EPA Proposed Plan Riverbank Analysis





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<b>Date</b>	<b>Description</b>	<b>Author</b>	<b>Recipient</b>
08/00/2004	Final NW Natural "Gasco" Site Removal Action Work Plan	Environmental, LLC)	(NW Natural)
12/20/2004	Request for Formal Dispute Resolution EPA Comments on Draft Final Design Submittal	Wyatt, Robert J. (NW Natural)	Sheldrake, Sean A. (EPA)
01/14/2005	GASCO Formal Dispute Regarding EPA Comments on Draft Preliminary Design Submittal; Waste Material Disposal	Sheldrake, Sean (EPA)	Wyatt, Robert (NW Natural)
01/18/2005	Gasco Removal Action; CERCLA Docket No. 10-004-0068; Formal Dispute Resolution Regarding EPA Directed Changes to Draft Final Design Submittal	Wyatt, Robert J. (NW Natural)	Sheldrake, Sean A. (EPA)
01/27/2005	Parametrix Technical Memorandum, Comments on January 18, 2005 NW Natural Dispute Resolution Letter	Wadsworth, Rick (Parametrix);	Sheldrake, Sean A. (EPA)
02/08/2005	Memorandum, Response to Parametrix January 27, 2005 memo comments on the January 18, 2005 NW Natural Dispute Resolution Letter for the Gasco Removal Action	Stivers, Carl (Anchor Environmental, LLC); Verduin, John (Anchor Environmental, LLC); Schwarz, Rick (Anchor	Sheldrake, Sean A. (EPA)
02/18/2005	Memorandum, Second Formal Dispute Resolution-Interim Decision, Gasco Facility, Portland, Oregon, Administrative Order on Consent for Removal Action Docket No. 10-2004-0068	Opalski, Daniel D. (EPA)	Wyatt, Robert J. (NW Natural)
06/17/2005	Action Memorandum for a Non-time-critical Removal Action at the GASCO site within the Portland Harbor Superfund Site, Portland, Multnomah County, Oregon; Site ID: BW	Sheldrake, Sean (EPA)	Opalski, Daniel D. (EPA)
07/00/2005	Removal Action Project Plan; NW Natural Gasco Site	(Anchor	(EPA)
07/26/2005	Clear Water Act Section 401 Water Quality Certification; Removal Action Northwest (NW) Natural Gasco Site	(EPA)	
07/29/2005	DEQ review report and letter authorization for Port of Morrow Barge Terminal Solid Waste Disposal Site Permit	(Oregon DEQ)	Jiries, Samir (Waste Management Disposal Services of Oregon)
08/03/2005	Comments on draft final RAPP dated July 28, 2005	Sheldrake, Sean (EPA)	Wyatt, Robert (NW Natural)
03/00/2006	Final Monitoring and Reporting Plan - Post Construction, Removal Action, NW Natural Gasco Site	(Anchor Environmental, LLC);	(EPA)
04/00/2006	Final Removal Action Completion Report - Removal Action, NW Natural Gasco Site	(Anchor Environmental, LLC);	(EPA)
09/00/2006	DRAFT Data Summary Report, Year 0 Event 1 Long-term Pilot Cap Monitoring, Removal Action, NW Natural Gasco Site	(Anchor Environmental, LLC); (NW Natural)	(EPA)
10/06/2006	Gasco Long-term Monitoring Approach - Year 0 Event 1 Data Summary Report	Barth, Ryan (Anchor Environmental, LLC)	Sheldrake, Sean A. (EPA)
10/13/2006	Gasco Early Removal Action Construction Oversight Report	(Parametrix)	(EPA)

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Date	Description	Author	Recipient
02/00/2007	Data Summary Report, Year 0 Event 2 Long-term Pilot Cap Monitoring, Removal Action NW Natural Gasco Site	(Anchor Environmental, LLC); (NW Natural)	(EPA)
02/21/2007	Gasco Long-Term Monitoring Approach Year 0 Event 2 Data Summary Report	Barth, Ryan (Anchor Environmental, LLC)	Sheldrake, Sean A. (EPA)
02/22/2007	NW Natural Comments on the Draft Gasco Early Removal Action Construction Oversight Report	Stivers, Carl ( Anchor Environmental, LLC); Barth, Ryan (Anchor Environmental, LLC)	Sheldrake, Sean A. (EPA)
04/18/2007	Gasco Removal Action; EPA's Comments on NW Natural Responses to EPA Comments on Year 0, Event 1 Long-term Monitoring Data Summary Report and the NW Natural Year 0, Event 2 Long-term Monitoring Data Summary Report	Sheldrake, Sean (EPA)	Wyatt, Robert (NW Natural)
04/25/2007	EPA Comments on Gasco Diver Survey	Parker, Eric (RSS)	Barth, Ryan (Anchor Environmental, LLC)
05/00/2007	Data Summary Report, Year 0 Event 3 Long-term Pilot Cap Monitoring, Removal Action NW Natural Gasco Site	(Anchor Environmental, LLC); (NW Natural)	(EPA)
06/00/2007	Annual Data Evaluation Monitoring Report, Year 0 Long-Term Pilot Cap Monitoring, Removal Action NW Natural Gasco Site	(Anchor Environmental, LLC); (NW Natural)	(EPA)
06/04/2007	NW Natural Responses to EPA Comments on the Year 0 Event 1 and Year 0 Event 2 Long-Term Monitoring Data Summary Reports, Gasco Site Removal Action	Barth, Ryan (Anchor Environmental, LLC); Stivers, Carl (Anchor Environmental, LLC)	Sheldrake, Sean A. (EPA)
09/00/2007	Annual Data Evaluation Monitoring Report, Year 0 Long-Term Pilot Cap Monitoring, Removal Action NW Natural Gasco Site	(Anchor Environmental, LLC); (NW Natural)	(EPA)
09/24/2007	NW Natural Responses to EPA Comments on the Annual Data Evaluation Monitoring Report Year 0 Long-Term Pilot Cap Monitoring and the Year 0 Event 3 Long-Term Monitoring Data Summary Report, Gasco Site Removal Action	Barth, Ryan (Anchor Environmental, LLC); Stivers, Carl ( Anchor Environmental, LLC)	Sheldrake, Sean A. (EPA)
02/00/2008	Data Summary Report Year 1 Event 1 Long-Term Pilot Cap Monitoring, Removal Action NW Natural Gasco Site	(Anchor Environmental, LLC); (NW Natural)	(EPA)
03/26/2008	Proposed Revised Long-Term Pilot Cap Monitoring Approach - NW Natural Gasco Site	Barth, Ryan (Anchor Environmental, LLC); Stivers, Carl ( Anchor Environmental, LLC)	Sheldrake, Sean A. (EPA)
04/00/2008	Data Summary Report Year 1 Event 2 Long-Term Pilot Cap Monitoring, Removal Action NW Natural Gasco Site	(Anchor Environmental, LLC); (NW Natural)	(EPA)



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04/30/2008	Gasco Removal Action; EPA Comments on the Proposed Revisited Long-Term Pilot Cap Monitoring Approach, March 26, 2008, Data Summary Report, Year 1 Event 1 Long-Term Monitoring. February 2008, and Data Summary Report, Year 1 Event 2 Long-Term Monitoring. April 28.	Sheldrake, Sean (EPA)	Wyatt, Robert (NW Natural)
05/00/2008	Annual Data Evaluation Monitoring Report, Year 1 Long-Term Pilot Cap Monitoring, Removal Action NW Natural Gasco Site	(Anchor Environmental, LLC); (NW Natural)	(EPA)
09/10/2008	NW Natural Responses to EPA Comments on the Annual Data Evaluation Monitoring Report - Year 1 Long-Term Pilot Cap Monitoring, Gasco Removal Action	Barth, Ryan (Anchor Environmental, LLC)	Sheldrake, Sean A. (EPA)
12/00/2008	Data Summary Report, Year 2 Event 1 Long-Term Pilot Cap Monitoring, Removal Action, NW Natural Gasco Site	(Anchor Environmental, LLC); (NW Natural)	(EPA)
05/00/2009	Data Summary Report, Year 2 Event 2 Long-Term Pilot Cap Monitoring, Removal Action NW Natural Gasco Site	(Anchor QEA, LLC); (NW Natural)	(EPA)
07/00/2009	Annual Data Evaluation Monitoring Report, Year 2 Long-Term Pilot Cap Monitoring, Removal Action NW Natural Gasco Site	(Anchor QEA, LLC); (NW Natural)	(EPA)
08/19/2009	Gasco Removal Action; EPA Comments on the Annual Data Evaluation Monitoring Report and Data Summary Reports	Sheldrake, Sean (EPA)	Wyatt, Robert (NW Natural)
08/21/2009	NW Natural Responses to EPA Comments on the Annual Data Evaluation Monitoring Report - Year 2 Long-Term Pilot Cap Monitoring, Gasco Removal Action	Barth, Ryan (Anchor QEA, LLC)	Sheldrake, Sean A. (EPA)
09/09/2009	Administrative Settlement Agreement and Order on Consent for Removal Action, U.S. EPA Region 10 CERCLA Docket No. 10-2009-0255, Gasco Sediments NW Natural and Siltronic Corporation	(EPA)	(NW Natural); (Siltronic)
11/00/2009	Data Summary Report, Year 3 Event 1 Long-Term Pilot Cap Monitoring, Removal Action NW Natural Gasco Site	(Anchor QEA, LLC); (NW Natural)	(EPA)
04/00/2010	Data Summary Report, Year 3 Event 2 Long-Term Pilot Cap Monitoring, Removal Action NW Natural Gasco Site	(Anchor QEA, LLC); (NW Natural)	(EPA)
05/00/2010	Annual Data Evaluation Monitoring Report, Year 3 Long-Term Pilot Cap Monitoring, Removal Action NW Natural Gasco Site	(Anchor QEA, LLC); (NW Natural)	(EPA)

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Date	Description	Author	Recipient
07/02/2010	EPA Response to NW Natural Comments on Year 3 Annual Data Evaluation Monitoring Report, Long-Term Pilot Cap Monitoring, NW Natural Gasco Site	Sheldrake, Sean (EPA)	Wyatt, Bob (NW Natural)
07/30/2010	NW Natural Response to EPA Comments on Year 3 Reporting, Long-Term Pilot Cap Monitoring, NW Natural Gasco Site and Data Summary Reports	Barth, Ryan (Anchor QEA, LLC)	Sheldrake, Sean A. (EPA)
10/18/2010	NW Natural Additional Response to EPA Comments on Year 3 Reporting, Long-Term Pilot Cap Monitoring, NW Natural Gasco Site	Barth, Ryan (Anchor QEA, LLC)	Sheldrake, Sean A. (EPA)
09/27/2012	Gasco-Specific Issue Comments on Draft Gasco EE/CA Report (dated May 2012)		
11/12/2012	Table 1 - Response to EPA Comments on the Draft EE/CA, Gasco Sediments Site		
11/29/2012	Substantial Product Evaluation at U.S. Moorings Site, Gasco Sediments Site	Sheldrake, Sean (EPA)	Wyatt, Bob (NW Natural); McCue, Tom (Siltronic Corp.)
02/21/2013	Gasco-Specific Issue Comments on Draft Gasco EE/CA Report (dated May 2012)		
05/15/2013	Response of NW Natural to EPA Evaluations at U.S. Moorings Sediments Area, Gasco Sediments Site	Wyatt, Bob (NW Natural)	Sheldrake, Sean A. (EPA)
05/30/2013	Gasco Streamlined EE/CA Format Matrix (Based on Focused Evaluation of SP and RALs) DRAFT		
06/11/2013	Revised Remedial Alternatives Discussion Outcome, Gasco Sediments Site	Sheldrake, Sean (EPA)	Wyatt, Bob (NW Natural); Burr, Myron (Siltronic Corp)
06/24/2013	Revised Remedial Alternatives Path Forward, Gasco Sediments Site	Wyatt, Bob (NW Natural)	Sheldrake, Sean A. (EPA)
07/17/2013	Draft Matrix: Table 1 - Gasco Sediments Site Revised Engineering Evaluation/Cost Analysis Remedial Alternatives		
07/26/2013	Draft Matrix: Table 1 - Gasco Sediments Site Revised Engineering Evaluation/Cost Analysis Remedial Alternatives Updated July 26, 2013		
08/09/2013	Draft Information Supporting Substantial Product Evaluations, Gasco Sediments Site Remedial Alternatives		
08/30/2013	EPA Response to the <i>Draft Information Supporting Substantial Product Evaluations</i> by NW Natural and Spintronic Corporation dated August 9, 2013, Gasco Sediments Site	Sheldrake, Sean (EPA)	Wyatt, Bob (NW Natural); Burr, Myron (Siltronic Corp)



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Date	Description	Author	Recipient
09/09/2013	EPA's Response to NW Natural's Response to EPA's Review of <i>Study Design for Sediment Characterization Adjacent to U.S. Moorings Site Addendum 1 to the Project Area Identification Report Quality Assurance Project Plan</i> , Gasco Sediments Site	Sheldrake, Sean (EPA)	Wyatt, Bob (NW Natural); Burr, Myron (Siltronic Corp)
09/10/2013	NW Natural and Siltronic Corporation Response to EPA Review of Action Items 3 and 4 Regarding the Refinement of the Remedial Alternatives, Gasco Sediments Site	Barth, Ryan (Anchor QEA, LLC)	Sheldrake, Sean A. (EPA)
10/03/2013	Proposed Methods for the Substantial Product Accessibility Analysis, Gasco Sediments Site	Barth, Ryan (Anchor QEA, LLC)	Sheldrake, Sean A. (EPA)
01/24/2014	Response to Proposed Methods for the Substantial Product Accessibility Analysis, Gasco Sediments Site	Sheldrake, Sean (EPA)	Wyatt, Bob (NW Natural); Burr, Myron (Siltronic Corp)
05/05/2014	Table 1 - Coordination of Resolution of Portland Harbor Gasco Sediments Site Technical Issues		
05/05/2014	Gasco Sediments and Portland Harbor Processes, NW Natural Gasco Site	(Anchor QEA, LLC)	
06/20/2014	Gasco Sediments Site - Distributed Temperature Sensing Work Plan	Barth, Ryan (Anchor QEA, LLC)	Sheldrake, Sean A. (EPA)
07/28/2014	Response to Gasco Sediments Site - Distributed Temperature Sensing Work Plan	Sheldrake, Sean (EPA)	Wyatt, Bob (NW Natural); Burr, Myron (Siltronic Corp)
08/11/2014	Dive Safety and Work Plan, Distributed Temperature Sensor Deployment, Gasco Sediments Site, Willamette River, Portland, Oregon	(Research Support Services for Anchor QEA)	
09/04/2014	Response to NW Natural Response to EPA Comments on Gasco Sediments Site - Distributed Temperature Sensing Work Plan	Sheldrake, Sean (EPA)	Wyatt, Bob (NW Natural); Burr, Myron (Siltronic Corp)
09/09/2014	NW Natural's Response to Additional EPA Comments on Gasco Sediments Site - Distributed Temperature Sensing Work Plan	Barth, Ryan (Anchor QEA, LLC)	Sheldrake, Sean A. (EPA)
09/11/2014	Conditional Approval for Revised Gasco Sediments Site - Distributed Temperature Sensing Work Plan	Sheldrake, Sean (EPA)	Wyatt, Bob (NW Natural); Burr, Myron (Siltronic Corp)
02/02/2015	Groundwater Source Control Phase 1 Testing Data Summary and Analysis Report	(Anchor QEA, LLC)	(NW Natural)
05/01/2015	Hydraulic Control and Containment System Capture Performance and Monitoring Plan, NW Natural Gasco Site	(Anchor QEA, LLC)	(NW Natural)
10/21/2015	Gasco Sediments Flow Chart Evaluation Figures		
11/16/2015	Gasco Sediments Site 2009 Statement of Work Waste Suitability Determination Framework	(NW Natural)	(EPA)

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<b>Date</b>	<b>Description</b>	<b>Author</b>	<b>Recipient</b>
01/06/2016	Distributed Temperature Sensing for the Detection of Groundwater Seepage, NW Natural Gasco Sediments Cleanup Action	(Anchor QEA, LLC); (NW Natural)	(EPA)
02/08/2016	Technical Memorandum: Cap Demonstration Requirements - Gasco Sediments Site Cleanup Action	Verduin, John (Anchor QEA); Barth, Ryan (Anchor QEA); Smith, Joe (Anchor QEA)	Sheldrake, Sean A. (EPA)
06/02/2016	Letter to follow-up on points raised in recent correspondence from Siltronic to EPA and DEQ. Gasco Sediments Site, U.S. EPA Region 10, CERCLA Docket No. 10-2009-0255, Gasco Uplands Facility, DEQ ECSI File No. 84	Dost, Patricia (Pearl Legal Group)	Cora, Lori Houck (EPA); Vrooman, Gary (ODOJ)
06/02/2016	NW Natural request for meeting with EPA regarding integrating work from EE/CA into the Proposed Plan , Gasco Sediments Site, U.S. EPA Region 10, CERCLA Docket No. 10-2009-0255	Wyatt, Bob (NW Natural)	Grandinetti, Cami (EPA)
08/16/2016	Response from EPA regarding NW Natural letter requesting a meeting to discuss integrating work from the May 2012 EE/CA into the Portland Harbor Superfund Site Proposed Plan and subsequent comment letter from NW Natural dated July 19.	Grandinetti, Cami (EPA)	Wyatt, Bob (NW Natural)